TAMPERE UNIVERSITY OF TECHNOLOGY

DUAN XIAOBO

Evaluation of Technical Solutions for Advanced Mobile Services Based on a Consumer Study

Master of Science Thesis

Examiners: Professor Artur Lugmayr
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ABSTRACT

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This thesis is a study of mobile services based on consumer's evaluation, which includes market and survey analysis from the statistics of a mobile services' survey. The background knowledge and market effects will be discussed at the beginning and the findings will be discussed in section "Mobile Services Survey".

Mobile phone users expect that mobile phone is a versatile digital assistant. Information exchange and navigation are the most popular mobile services. The competition between mobile phone manufacturers, their business models and operating systems will bring more advanced mobile services to consumers.

To develop successful mobile services, the most important thing is to understand customer requirements and to design the mobile services to meet their expectations. The evaluation of typical mobile services is the main subject in this thesis, the analysis and background knowledge research are based on the mobile services survey result.

The survey's results indicated that the location, navigation and GPS services are the most popular mobile service, the second most popular mobile service is sending and receiving emails, the third is tickets and seats reservation. The lowest mobile service is advertising in the free application.

It is obvious that the mobile services will continue to evolve and become more and more central to everyday lives of consumers. Based on the study in this thesis, location-based services and applications will bloom in the future. Mobile advertising should find more smart delivery channels to gain popularity; otherwise it will never become fully accepted by consumers.

PREFACE

First of all I would like to thank Professor Artur Lugmayr for proving me with an interesting topic for my thesis, for the help in setting the goals, for structuring my work, and for all general advices. I also would like to thank Professor Irek Defee for his patience and valuable input towards my thesis work.

I wish to express my appreciation to my friend Liu Ning and his family for pushing me forward and care for my life. I also want to thank my friend Yuan Quan, Yang Yuan, Yang Chenxi, Wang Yekui, Ma Minghao, Chen Minwen and their family for helping my life and studies in Finland.

Finally, I wish to express my most sincere gratitude to my parents. I cannot finish my studies without your support.

Tampere, June 8th, 2010

DUAN XIAOBO

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ABBREVIATIONS

3G/4G	Third/Fourth Generation of Mobile Standards and Technology
API	Application Programming Interfaces
CP	Contents Provider
CPU	Central Processing Unit
CRBT	Coloring Ring Back Tone
GIS	Geographical information systems
GPS	Global Positioning System
IM	Instant Messaging
IT	Information Technology
IVR	Interactive Voice Response
LBS	Location-Based Service
MLBS	Mobile Location-Based Service
MMS	Multimedia Messaging Service
MNO	Mobile Network Operator
OS	Operating System
POS	Point Of Sale terminal or checkout
R&D	Research and Development
SIM	Subscriber Identity Module
SMS	Short Message Service
SNS	Social Networking Sites
SP	Service Provider
WAP	Wireless Application Protocol
Wi-Fi	Wireless Fidelity
XML	Extensible Markup Language

1. Introduction

The internet was invented for sharing information among computers in the last century, which has highly evolved through connecting millions of computers and exchanging massive amount of information. The internet has become a commonly used medium for information exchanging, communication and entertainment. Since the mobile internet can be accessed anytime and anywhere, mobile internet has greater potential to create more abundant mobile contents by mobile users.

Over the past decade, mobile networking and mobile phones have significantly developed and become rapidly interconnected with the development of the internet. The typical internet services are translating from the pc-based internet to the mobile–based mobile internet due to the development of improved wide area cellular data coverage and the seamless integration of wireless data access into mobile phone. Mobile services providers (MSP) are delivering value-based contents by broadband technologies, 3G. Therefore, the innovation of mobile services like location-based services, voice-based services, data services and multimedia services are emerging in the mobile services market.

To develop successful mobile services, the most important thing that is to understand customer requirements and to design the mobile services to meet their expectations. In this chapter will discuss mobile services background and related knowledge.

1.1 Background

The development of mobile services is not standalone, which is a part of a complex structure that spans mobile phones, R&D platform, cellular networks and internet services.

With Digital camera lens, GPS module, Wi-Fi module, Touchscreen, Bluetooth module, Qwerty keyboard, and other functional modules that have been assembled inside mobile phones, those features have transformed mobile phones from relatively simple voice-based handsets to more complicated multimedia communication tools.

The mobile phone manufacturers, mobile service providers and IT companies are leading consumers to the era which highlights the individual pursuit of rapid information exchange with the outside world. As an illustration, mobile phone users can create a

variety of contents (pictures, sound records, videos, texts) by mobile phones or other digital devices and share those contents with friends through Short Message Service (SMS) / Multimedia Messaging Service (MMS), Instant Messaging (IM), Social Networking Sites (SNS) or a personal webpage.

Web 2.0 services will eventually replace many uses of a desktop computer application, which is not a technical standard but contains technical architecture and software applications. Indeed, Web 2.0 is characterized by a platform which encourage the adoption of end-use as a dynamic interact information-sharing; as a result, massive information have enriched contents of different mobile services and mobile internet.

3G and 4G technologies provide better data capabilities and a wider range of more advanced services through improved bandwidth efficiency. 3G network performance tests had launched in the 13 cities of the U.S. in December 2009 and January 2010, and show in the AT&T network an average download speed of 1410 kbps and an average upload speed of 773 kbps by using laptop, an average download speed of 1259 kbps and an average upload speed of 215 kbps by using iPhone. These results show that the download speed of a smartphone is close to the laptop, although the upload speed is much less. According to these results, mobile phone users could watch online TV programs, play online games, surf the internet fluently and download mp3 or video clips in a few minutes. Without a doubt, massive data could be delivered fast from server to clients. In addition, the interactive communication and data exchange between customers will speed up (Sullivan 2010).

The 4G network is even more advanced design, with nominal data rate of 100 Mbit/s when the client physically moves at high speeds relative to the station, and 1 Gbit/s when client and station are in relatively fixed positions as defined by the ITU-R (International Telecommunication Union Radio-communication Sector). Accordingly, huge data transmission and reliable telecommunication techniques are available in 4G, which will boost the development of advanced mobile services (Kim and Ramjee 2006).

Many web services and Application Programming Interfaces (API) were originally developed with server to server or server to browser in mind, which have no aim to design portable mobile applications. The platform of mobile services have their own set of challenges, like bandwidth, memory and CPU availability, connectivity options and issues, storage capacity, security, user interaction and display. In addition, the interface of mobile services needs to be compatible with different mobile phone OS's and different operator networks. (Christoph et al 2007)

Creating networked wireless applications requires a broad set of techniques and knowledge of client technologies, for instance, the server technologies and the Mobile Information Device Profile (MIDP), a fundamental part of Java 2 Platform, Micro Edition (J2ME).

With these wireless technologies, mobile users can acquire mobile services while on the move, which gives mobile users great flexibility and convenience. There is increasing number of mobile services. For example, in Mobile Location-Based Service (MLBS), mobile users could ask for geographical information to find a cinema of their choice in the nearby or the highest peak interests in the area. Another example is mobile service of bank services, the bank account information and services could be delivered by wireless connection to mobile phone.

1.2 Mobile services knowledge

Mobile Location Based Service (MLBS) is a service that is detecting and obtaining mobile terminal location information in the latitude and longitude coordinate through the networks of mobile operator. It needs support from the platform of electronics map. As Koeppel wrote that LBS is "any service or application that extends spatial information processing, or GIS capabilities, to end users via the Internet and/or wireless network" (Koeppel 2000). Shiode states that LBS are "geographically-oriented data and information services to users across mobile telecommunication networks" (Shiode et al. 2004).

There are two major LBS tasks, locating of a user and utilizing this information to provide a service. Position-aware services that depend on device's knowledge of its own location and location-tracking services are based on user's location. (Barkhuus and Dey 2003) The LBS application could be roughly divided to public safety service, tracking service, personnel information service, navigation, and charging by location service. According to these definitions, the Internet GIS and online map services can be considered important LBS applications which provide geographic information services through mobile networks environments or the Internet to mobile devices (Jiang and Yao 2008).

WAP (Wireless Application Protocol) is widely used in 2G mobile network and has provided very limited support for data services due to its low data capacity. 3G/4G, LAN, local Wi-Fi, and WiMAX enables mobile users to access various multimedia services across networks with the high speed.

Mobile Instant Messenger (MIM) is a mobile version of Instant Messaging (IM) service, which is a real-time direct text-based communication between two or more people by using mobile devices.

The development of mobile service from what appear as fragmented online experience to full mobile community is needed, at almost all of technical support is ready to build up such a mobile community. The users' location search and users' personal community (similar with SNS community) bundled within the mobile phones. Those are the keys of

mobile community.

Mobile community technical supporting can be based on:

- A personal community webpage (e.g. similar with Twitter/Google Buzz)

    a. Tweets are text-based posts of up to 140 characters displayed on the author's profile page and delivered to the author's subscribers who are known as followers. Senders can restrict delivery to those in their circle of friends or, by default, allow open access.

    b. Google buzz is building mobile community inside of Gmail. Picasa, Flickr, Twitter, Google Reader, YouTube, Blogger are currently integrated.

- The updates (SMS/MMS, phone call) post of user's current location (roughly/in a certain range) in the users' personal community webpage and the subscribers/followers will know the latest update and users status. Maps show your subscribers/followers location (Google Map/Nokia Map/Bing Map/Yahoo Map/GPS Maps)

    Example:

    a. Janni's mobile phone is switched off/broken during the trip, his parents worry about him but cannot reach him, they can check his last status (or last SMS/MMS, last call location) in personal community webpage.

    b. My friends could know where I am and what I am doing

    c. The variety of uses of location search and location detection

- The instant messaging bundled with mobile phone, it shows users current situation (busy, lunch, not available). Mobile phone need a function which shows the status of users, like where they are, what they are doing, and it will deliver this information to their related friends or who has the permission to see it. It is linked with Facebook or personal blogs. Twitter and Google Buzz are doing this.

- Attracting mobile phone users by relying on mobile community will be the trends in mobile services industry.

2. Value-added mobile services

The value-added services of the mobile phone are the most common mobile services in the market. Value-added services are supplied by a Service Provider (SP) or Contents Provider (CP) and a Mobile Network Operator (MNO, also known as mobile phone operator, carrier service provider or wireless service provider).

For instance, the MNO is responsible for building the telecommunication platform, networks and their maintenance in the first place. Next, a mobile phone manufacturer designs the functions of mobile phones according to users' requirements and market trends. Then, the SP, CP, and MNO offer variety mobile services and they are responsible for managing data and services maintenance. Finally, customers give feedback and further requirements to the mobile phone manufacturer company, CP, SP and MNO.

2.1 An example of a MSP company

Most of the MSP companies have their own products, service platform and technical support. North Sky Limited Co. is a typical MSP company with headquarter in Beijing, China, it has 23 agents around the whole country. North Sky have co-operated with China Mobile, China Union and China Telecom for mobile value-added services. The media products (ringtones, desktop background, screen saver, themes and e-Magazine), Coloring Ring Back Tone (CRBT), SMS/MMS and Interactive Voice Response (IVR) are their major business. The process of their media contents creation, delivery channel networks and hardware solutions are roughly described in this section.

The normal digital media products creation includes materials selection, contents creation, contents categorization and contents distribution. First, the related materials are chosen from media library according to products requirements. Second, the raw materials need to be create, edit and format by using edition tool and media process software. Next, the processed materials (or mobile contents) need to be classified into the different categories. At the end, the mobile contents is ready to distribute through different channels, e.g. by SMS/MMS, WAP sites and other internet webpage. Figure 1 shows the process of contents creation.

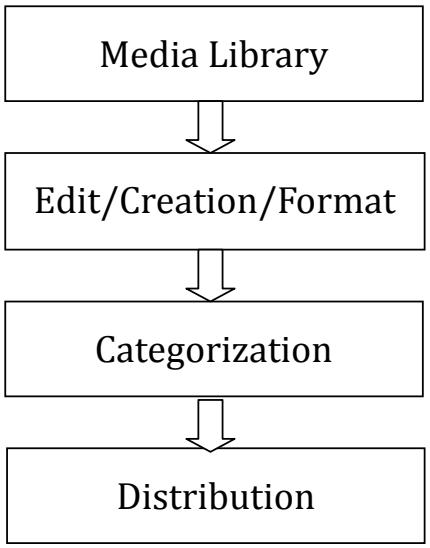

Figure 1: The contents creation and classification

A set of server and management terminals, which forms a small Local Area Network for supporting a SMS/MMS operation platform. In the SMS/MMS operation platform, specialists are able to create and process contents, engineers and technicians manage the customer database and system maintenance. Figure 2 shows the SMS/MMS platform networks. Table 1 shows the hardware specification (in 2007) of SMS/MMS servers and management terminal. Figure 3 shows the interface of the web-based management system. Figure 4 shows the interface of SMS/MMS delivery platform.

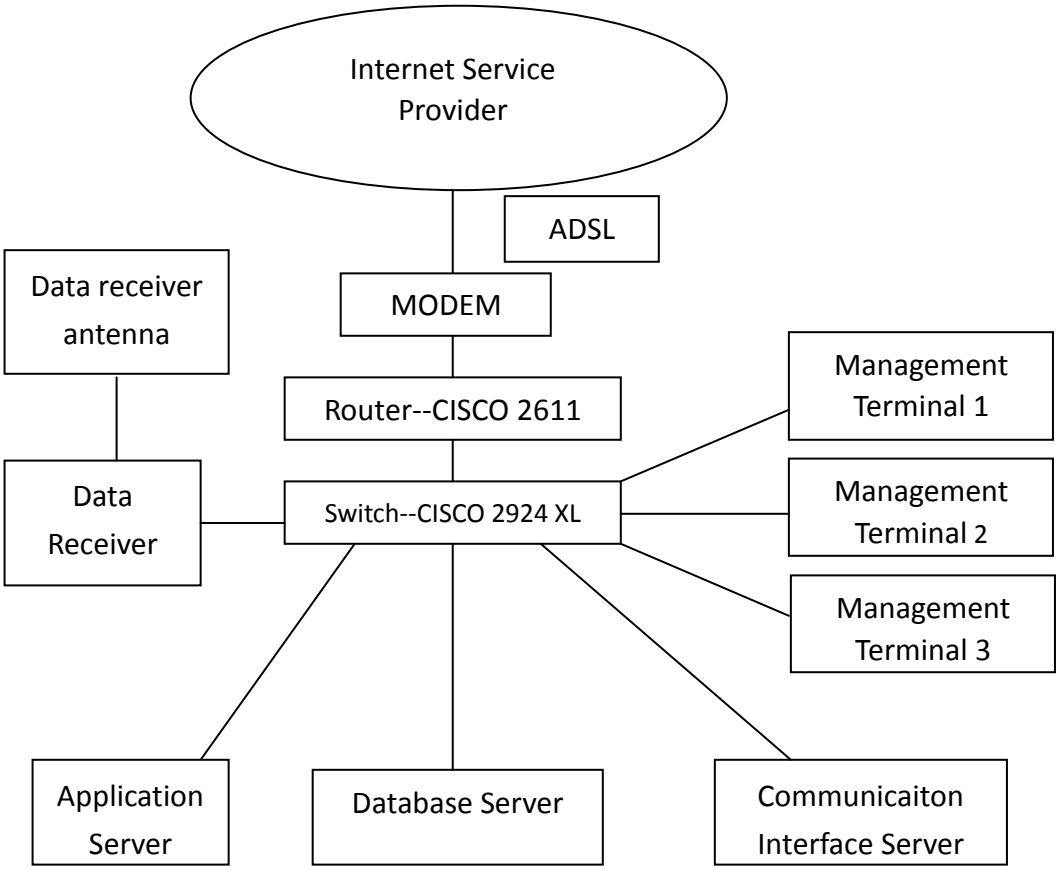

Figure 2: A sample of SMS platform networks (North Sky, 2007)

No.	Name	Description
1	CISCO 2611XM	Router 64M FLASH and 128M DRAM
2	CISCO 2924XL	Switch
3	IBM xSeries 336 Rackmount server	Communicaiton interface server Xeon 3.4 GHz/1024M DDR II/2*HD 80G/RAID
4	IBM xSeries 336 Rackmount server	Database server Xeon 3.4 GHz/1024M DDR II/2*HD 80G/RAID
5	IBM xSeries 336 Rackmount server	Application server Xeon 3.4 GHz/1024M DDR II/2*HD 80G/RAID
6	Stock data receiver	Lenovo M4600C P4 2.8G/1G DDR /60GB
7	Management Terminal	Lenovo M4600C P4 2.8G/1G DDR /60GB

Table 1: A list of different hardware solutions in 2007 (North Sky, 2007)

Figure 3: The management system of services management (North Sky, 2007)

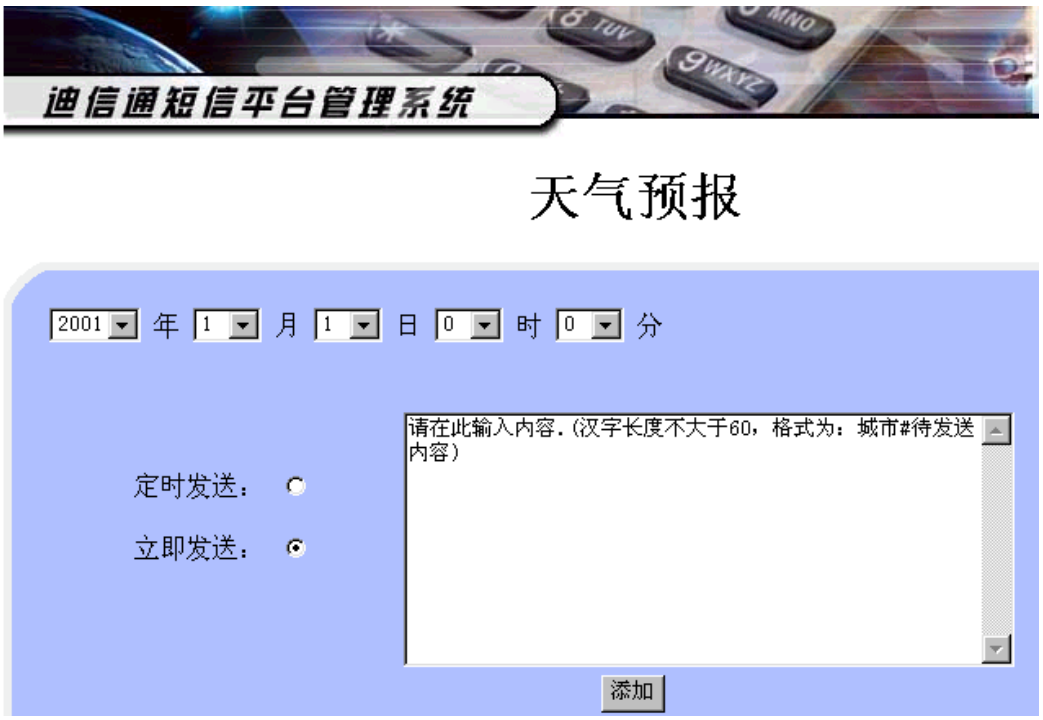

Figure 4: The platform of SMS delivery system (North Sky, 2007)

2.2 IVR and CRBT

There are some advanced mobile services based on special features of mobile phone, for instance, MMS, Java applications, Digital camera, GPS module, etc. But some basic mobile services are independent from features and do not rely on any technical support, i.e. Interactive Voice Response (IVR) service and Coloring Ring Back Tone service (CRBT).

IVR is a mobile phone voice based value-added services, customers get the service by calling an appointed phone number, choosing different services by following voice instruction, then the customers will get the specific service according to customer applied, receiving interactive services or required information. IVR service is independent of the features of mobile phones, only needs the essential mobile functions of calling or sending message. Any mobile phones could use it. IVR service enables operators to achieve maximum utilization of equipment. It is complementary to basic data services, using the IVR business users are actively transferred, which reduces the user's complaints and a variety of disputes, which is the reason why operators strongly support IVR service. Its vitality stems from IVR and internet integration, IVR business is in the

starting phase, the business content of the standardization and quality is the key to IVR development. The disadvantage of IVR business that there is no directly visual menu and guide and the voice instruction is complex to implement.

Coloring Ring Back Tone (CRBT) is another independent mobile service. CRBT can replace common “Du-Du” sound of Ring Back Tone (RBT) with the called party customized personalized RBT and play for the calling party. Therefore, the calling party can enjoy a different experience while waiting for the called party to answer the call. CRBT is becoming one of the most attractive mobile content with project worldwide revenue of 4.7 billion dollars by 2012 (Fierce Mobile Content 2008). CRBT replaces plain ring-back tones with music, a caller will hear as he/she waits for the receiver to answer. To use CRBT, a mobile phone customer selects a specific song or audio file to play instead of the standard ring tone heard while a call is connecting. Revenue is generated through monthly CRBT subscription charges and a CRBT download fee whenever the customer selects a new song or audio. Since it is completely controlled and delivered by network based signaling servers, CRBT has the advantage of allowing complete operator control with minimal customer and handset interaction. There are some big capital company are the loyal users which choose company promotions and company culture spread.

IVR and CRBT are the basic value-added services that will not expand further in this thesis. More study will focus on the advanced mobile services, which related with mobile phone functions, mobile OS and mobile software platform. Therefore, no basic mobile services questions in the mobile service survey, but those basic mobile services are very important business in value-added services, and they also have broad market prospects.

3. Mobile services survey

With the objective of indicating the acceptance of mobile phone users of different mobile services a mobile service online survey had been distributed to several oversea Chinese email lists and websites from April 26, 2010. There were totally 26 questions that included 4 demographic questions and 3 mobile phone brand related questions on the first page and 19 mobile services questions on the second page which asked acceptance of different mobile services by Likert Scale form. The online survey was made by Google Docs form. The results show that 215 responses had been received until May 31, 2010. The Figure 5 shows the number of daily responses.

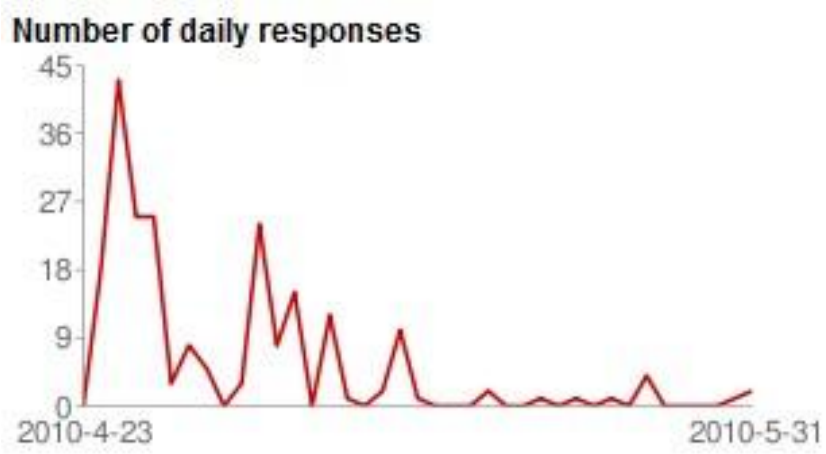

Figure 5: Number of daily responses

3.1 Demographic questions and analysis

Demographic questions consist of the questions about gender, age group, monthly incomes and monthly mobile phone expenses.

The responses include 138 (64%) male respondents and 77 (36%) female respondents. Obviously, men are more active to answer this survey and they are more interested in mobile services. Figure 6 shows the gender of the respondents.

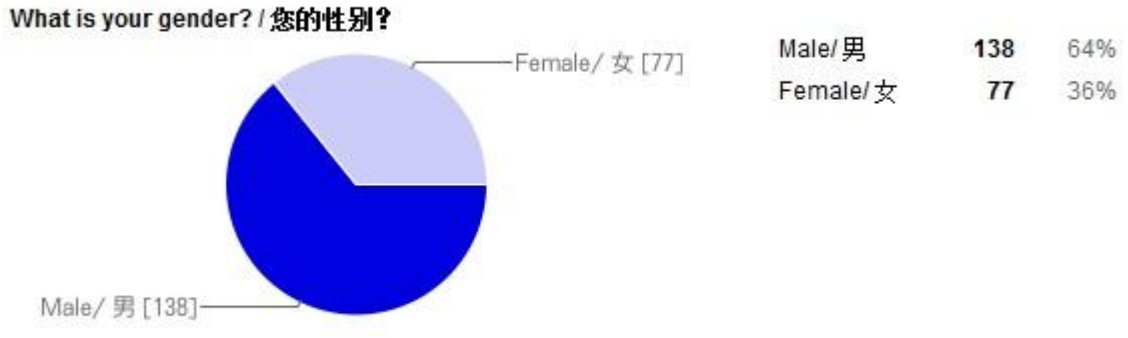

Figure 6: The gender of the respondents

In the age group question, 93 (43%) respondents are between 16 and 27, 90 (42%) respondents are between 28 and 39, 18 (8%) respondents are between 40 and 50, 9 (4%) respondents are great than 50 and 5 respondents (2%) are less than 16. The results indicated that mobile phone users from age 16 to 39, who are willing to answer mobile services questions. Furthermore, the respondents from age 16 to 39 are the most active users in mobile services and internet. Figure 7 shows the age group of the respondents.

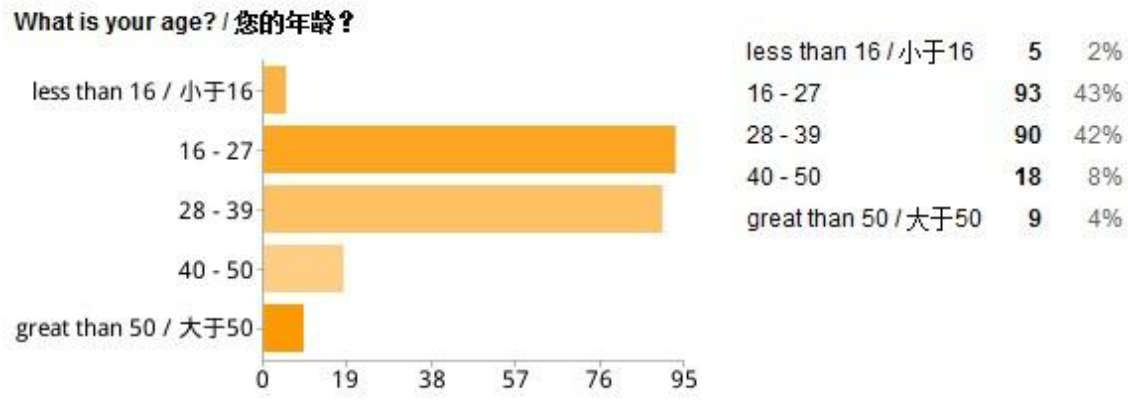

Figure 7: The age group of the respondents

In question "Your income per month", 52 (24%) respondents are less than 200 Euros , 43 (20%) respondents are between 200 - 400 Euros, 35 (16%) respondents are between 401

- 800 Euros, 22 (10%) are between 801 and 1300 Euros, 19 (9%) are between 1301 and 2000 Euros, 20 (9%) are between 2001 and 3000 Euros, 24 (11%) are bigger than 3000 Euros. The results indicated that the survey was distributed uniformly from different income groups. The income group of "Less than 200 Euros", "200 - 400" and "401 - 800" are 60% of the total respondents. From the Age group question, we know 43% respondents are between 16 and 27, hence young people are the most active respondents in this survey, and they are the active mobile consumers. Figure 8 shows the income groups of the respondents.

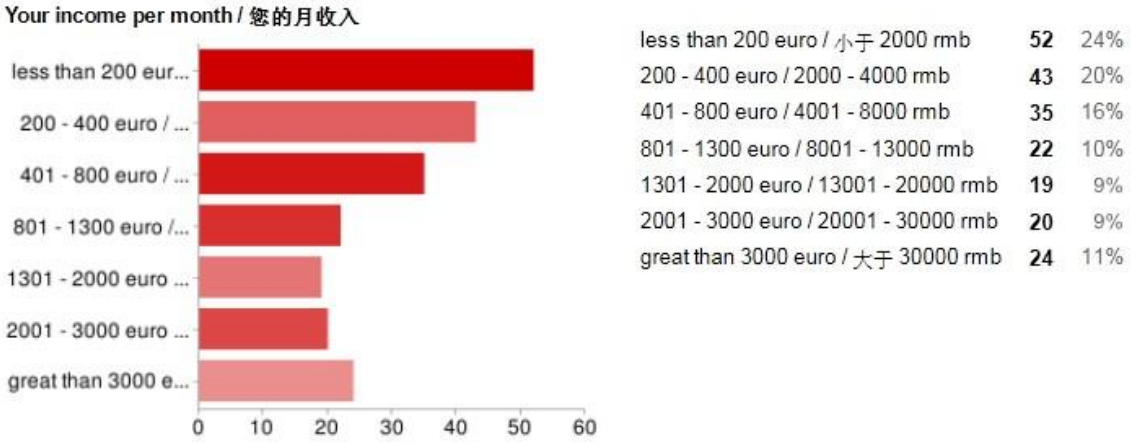

Figure 8: Income groups of the respondents

In question "How much you pay mobile phone bill per month", 100 (47%) respondents are less than 20 Euros at the first place, 65 (30%) respondents are between 20 and 40 Euros, 32 (15%) respondents are between 41 and 60 Euros, 5 (2%) are between 61 and 80 Euros, 6 (3%) are between 81 and 100 Euros, 7 (3%) are bigger than 100 Euros. The results indicated that the survey was distributed uniformly from different incomes groups, almost half of the respondents are less than 20 Euros, most of respondent are the low mobile expenses on calling and sending SMS. Figure 9 shows the mobile expense groups of the respondents.

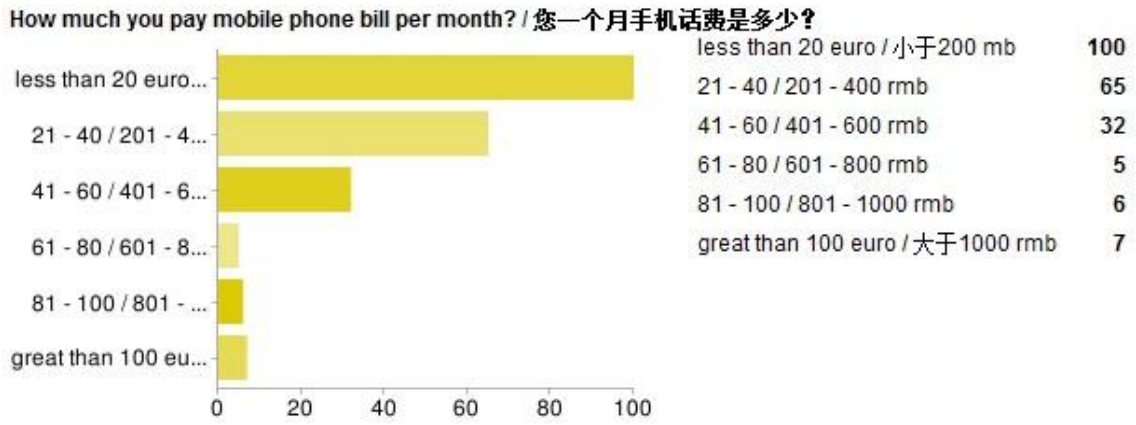

Figure 9: Mobile expense groups of the respondents

The results show that the respondents with high incomes and their mobile phone expenses are relatively higher than low incomes respondents. 7 respondents pay more than 100 Euros per month, 6 respondents pay 81 to 100 Euros per month, 5 respondents pay 61 to 80 Euros per month.

3.2 Mobile phone brand related questions and analysis

In this section, there are three questions which are related to the mobile phone brand and Operating System of mobile phones. The respondents would choose one or more answers in each question.

In the question "Which brand of mobile phone are you using", 115 respondents are using Nokia mobile phones, 28 are using Sony Ericsson, 28 are using Apple iPhone, 22 are using Samsung. 12 are using HTC with Google Android OS, 12 are using Motorola, 8 respondents are using LG, 7 respondents are using RIM Blackberry and another 12 are using other brands. Since some people are using two mobile phones or even more, therefore the whole amount of the respondents' mobile phone is 246, the average is 1.144 per respondent.

The survey results indicated that Nokia is the first mobile phone brand, Sony Ericsson and Apple iPhone at second place, Samsung at third place, Palm at the bottom. Therefore, the mobile services need consider the applications be compatible with Symbian OS and Maemo OS in the current mobile services market. On the other hand, Apple iPhone has rose quickly to the third place although it had just been launched in 2007. Zacks Equlity Research found that Chinese mobile phone users would consider the quality of mobile

phone at the first place when they choose a mobile phone, next comes the price. Nokia dominates 35% of Chinese mobile phone market in 2009, which reduced from 40% in 2008 (Zacks Equlity Research 2010). Figure 10 shows the current mobile phone brands of the respondents.

Figure 10: The current mobile phone brands of the respondents

In the question “Which brand of mobile phone is your favourite”, 121 respondents chose Nokia, 97 respondents chose Apple iPhone, those two brands is far leading the others. The survey results indicate that the brand and its cultural effects on consumers. Nokia represents reliable quality, easy operation, numerous appearances and stable services. In contrast, Apple iPhone has only one model in the market all the time, the new model replaces the old one when the hardware changed, and the appearance is almost same. In fact, the current Apple iPhone is not a mature mobile phone product since it can not e.g. forward a text message and has no Bluetooth transmission. However the Apple brand, the App store model, outstanding user operation experiences and its streamlined family of tech devices make iPhone strongly increasing growth share of mobile phone market. 30 respondents chose Sony Ericsson, the remarkable music phone and beautiful outlook that attracts young consumers. 28 respondents chose HTC with Google Android OS, 25 respondents chose RIM Blackberry, 15 respondents chose Samsung. Figure shows favourite brand of the respondents. Figure 11 shows the current mobile phone brands of the respondents.

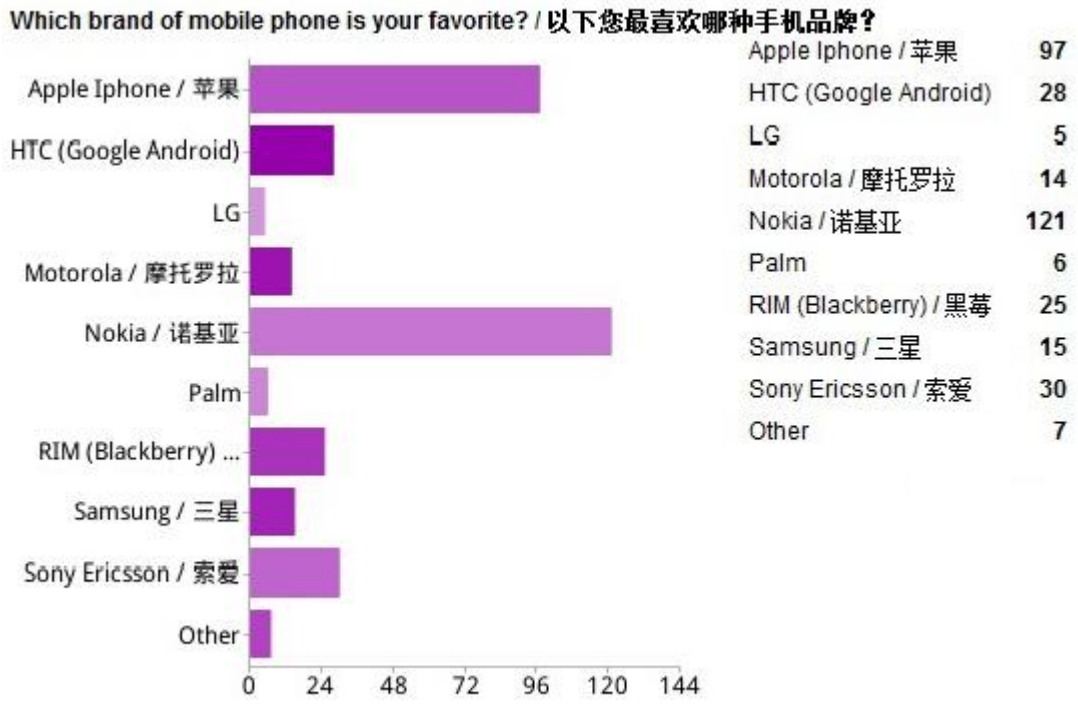

Figure 11: The favorite mobile phone brands of the respondents

In question "Which mobile phone OS do you think is better than others", many respondents chose two or more choices, and 57 have no idea. The survey results show that every mobile phone OS faces the keen competition, which makes consumer confused. 79 respondents think Apple iPhone OS is the best mobile phone OS, more than twice of the second position Google Android, which has already built up a commanding lead that bring a rich web experience and rich applications to a mobile device in the market, although it has no Flash support, lacks multitasking, it is unable to create folders and lacks Bluetooth support. But Apple App store business model is very successfully, it brings mobile phone from hardware-based competition to software-based and mobile services-based competition.

37 respondents chose Google Android OS, 31 chose Linux OS (Linux, Palm WebOS and Nokia Maemo) and 29 chose Symbian OS. Those three operating systems are closed to each other. Google Android OS is the latest OS in the choices list with rapid uptake increase after launch to the market. Symbian OS is slowly out of date and hard to bring new experiences to the mobile users. Many mobile manufacturers gradually quit from the Symbian due to its dominance by Nokia. The Linux OS is the not the first choice of manufacturers and consumers, it is an open platform but hard to excite interests due to

the insufficient support from mobile manufacturers. Only two respondents choose "Other" OS. Therefore, all of the famous OS competitors were listed in this question.

Apple iPhone OS and Google Android are friendly to mobile services, although not many people own them. Definitely, Apple App store makes the new revolution of the mobile services. Thousands of iPhone applications are available there and attract more mobile phone users. Google Android store is working in almost the same way. Figure 12 shows the favorite mobile phone OS of the respondents.

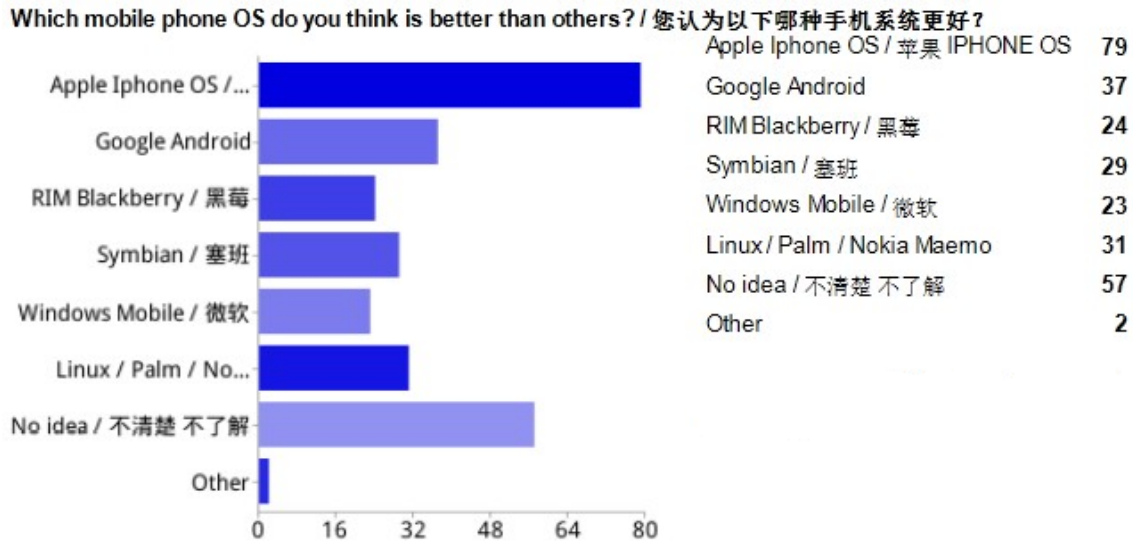

Figure 12: The favorite mobile phone OS of the respondents

3.3 Mobile services questions and analysis

To find out the preferences and motivations of mobile users, I selected 19 of the most frequently mentioned mobile services and used the analytical framework to evaluate them in this section.

The evaluation of each question by using a Likert scale, which was listed as a 5 points scale:

"1 = No / Strongly disagree"
"2 = Unlikely / Disagree"
"3 = Not sure / Neither agree or disagree"
"4 = Likely / Agree"
"5 = Strongly wanted / Strongly agree".

There was only one respondent who left a total blank in this section, maybe it was caused by server error of Google Docs.

In the question "Mobile instant messenger" (MIM), 74 respondents (34%) were "Strongly wanted", 60 (28%) were "Not sure", 42 (20%) were "Likely", 22 (10%) chose "No", 16 (7%) were "Unlikely". The results indicated that the favourite respondents are much more than the dislike respondents. 60 respondents need to decide after they use mobile instant messenger, at least they did not refuse to experience. There are several popular mobile versions of IM applications that could install in different mobile devices, e.g. MSN messenger mobile, Skype mobile, Yahoo mobile and QQ mobile. Figure 13 shows the result of the mobile instant messenger.

Figure 13: Mobile instant messenger

In the question "Mobile advertising in the free application", 145 (67%) respondents chose "No", 29 (13%) chose "Unlikely", 29 (13%) chose "Not sure". Only 3 (1%) chose "Strong wanted" and 8 (4%) chose "Likely". Definitely, the results indicated that mobile advertising should choose a smart delivery channel or make changes to avoid challenging the nerves of consumers. The traditional advertising SMS, pop-up flash advertising and scroll banner advertising that not only bring rich profits but also impressed badly to consumers. The mobile advertising is one of the most important business, advertising companies should consider how to improve a friendly interface, free software quality and bring benefits to consumers, e.g. a scroll banner laptop advertising which is just below an IT e-Magazine or a laptop evaluation webpage, clicks can be carried out directly into the online store consultation, then even order and pay it through mobile phone. This kind of mobile advertising could link consumers to "mobile connected life". Figure 14 shows the result of mobile advertising in the free application.

Figure 14: Mobile advertising in the free application

In the question "Location, navigation and GPS service", 121 (56%) respondents chose "Strongly wanted", 50 (23%) choose "Likely", 25 (12%) chose "Not sure", 11 chose "No", 7 chose "Unlikely". The results show that there is urgent requirement of location, navigation and GPS services in mobile phones. Figure 15 shows the result of location, navigation and GPS service.

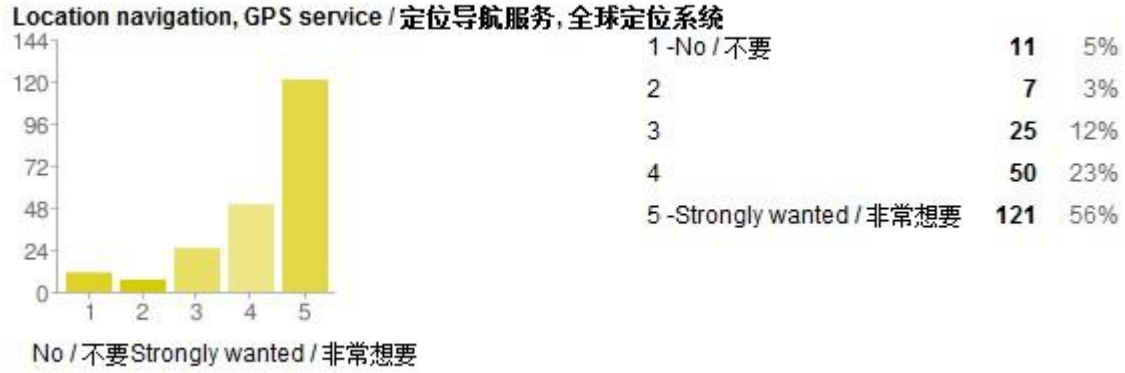

Figure 15: Location, navigation and GPS service

In the question "Playing online games", 68 (32%) respondents chose "No", 35 (16%) chose "Unlikely", 55 (26%) chose "Not sure", 26 (12%) chose "Likely", and 30 (14%) chose "Strongly wanted". Figure shows the acceptance of playing online games. With the development of CPU, memories, graphic chips, embedded hardware, gravity sensor, and more new technologies involved in and the business model of application store for

mobile phone, the experience of mobile games become more quick and interesting. By far the most popular category in the Apple App store is games. Distimo reported that 58% (more than 116,000) of all apps in the App Store are games. The biggest category of games is Puzzles (15%), next are Action games and Arcade games with 11% each. The average price of a paid game in App Store of Apple is $ 2.24, which is much cheaper than Windows Mobile game ($ 4.90), Blackberry game ($ 4.60), and a bit above Android game ($ 2.08). The Role playing games category is the most expensive with average price of $ 7.96, Adventure games is the second most expensive with average price of $ 4.43. Quality games ask higher prices, some of them offer free trial light version (Tech Crunch 2010). Figure 16 shows the result of playing online games.

1 -No / 不要	68	32%
2	35	16%
3	55	26%
4	26	12%
5 -Strongly wanted / 非常想要	30	14%

Figure 16: Playing online games

71 (33%) respondents chose “Not sure”, 62% chose “No”, 37 (17%) chose “Unlikely”, 24 (11%) chose “Likely”, 20 (9%) chose “Strong wanted”. Because of the SNS websites widespread, the online chatting room is not popular as before, so mobile version as well. But still 20% respondents want to have it, 33% stay in the neutral. Figure 17 shows the result of online chatting room.

1 -No / 不要	62	29%
2	37	17%
3	71	33%
4	24	11%
5 -Strongly wanted / 非常想要	20	9%

Figure 17: Online chatting room

In the question “Electronic payment in shops”, 60 (28%) respondents chose “Not sure”, 58 (27%) chose “Likely”, 44 (20%) chose “Strong wanted”, 33 (15%) chose “No”, 19 (9%) chose “Unlikely”. 47% of respondents showed they are interested in mobile payment.

The users of mobile payments reached 108 million in China in 2009, which increased 25.6% from 2008, and it will reach 147 million in 2010. RF-SIM (2.4 GHz) card chips and SIM-PASS (13.56 MHz) card chips are the main standard in China. SIM-PASS is compatible with POS terminal machines and they are using 13.56 MHz frequency bands. NFC, SIM-PASS and RF-SIM that are the main solutions for mobile payment, NFC needs integrate radio-frequency module within the mobile phone, SIM-PASS AND RF-SIM are directly integrated in SIM card (China Mobile, 2010).

Another electronic payment method is online bank transfer. MasterCard announced that its MoneySend mobile payment service is available to iPhone, which is a free app enabling person-to-person money transfer by wireless connection. The participating banks and credit unions support this mobile service. (AppScout 2010)

Figure 18 shows the result for the electronic payment in shops.

1 -No / 不要	33	15%
2	19	9%
3	60	28%
4	58	27%
5 -Strongly wanted / 非常想要	44	20%

Figure 18: Electronic payment in shops

In the question "Stock trading and checking", 61 (28%) chose "Not sure", 51 (24%) chose "Strongly wanted", 43 (20%) chose "Likely", 45 (21%) chose "No". Mobile users could check and trade stocks in a stock application or a mobile bank WAP site (support by local banks) which also gathering the stocks news, stock analysis and trends illustrate. Figure 19 shows the result of stock trading and checking.

1 -No / 不要	45	21%
2	14	7%
3	61	28%
4	43	20%
5 -Strongly Wanted / 非常想要	51	24%

Figure 19: Stock trading and checking

In the question "Sending and receiving emails", 117 (54%) respondents chose "Strongly wanted", 46 (21%) chose "Likely", 35 (16%) chose "Not sure", 9 (4%) chose "Unlikely" and only 7 (3%) chose "No". Email mobile clients are widely used in smartphone, the result indicated that sending and receiving emails is a popular mobile service. Qwerty keyboard and touch screen phone can enhance the typing experiences. Figure 20 shows the result of email services.

Figure 20: Sending and receiving emails

In the question "Reading news or e-Magazine (from subscription, feeds or web browser)", 74 (34%) chose "Strongly wanted", 59 (27%) chose "Likely", 51 (24%) chose "Not sure", 19 (9%) chose "No" and 11 (5%) chose "Unlikely". Reading books on mobile phone is becoming more and more popular with the enlarged mobile phone screen in China, active users reached 149 million in the third quarter, 2009. China Mobile announced that to invest 500 million Yuan to build a mobile reading base with ShengDa Literature co., Ltd. (People's Daily Online 2009)

The result indicated that news, e-magazine, even e-book reading through mobile phone is a popular service which is widely accepted by mobile users. Figure 21 shows the result of reading news or e-Magazine.

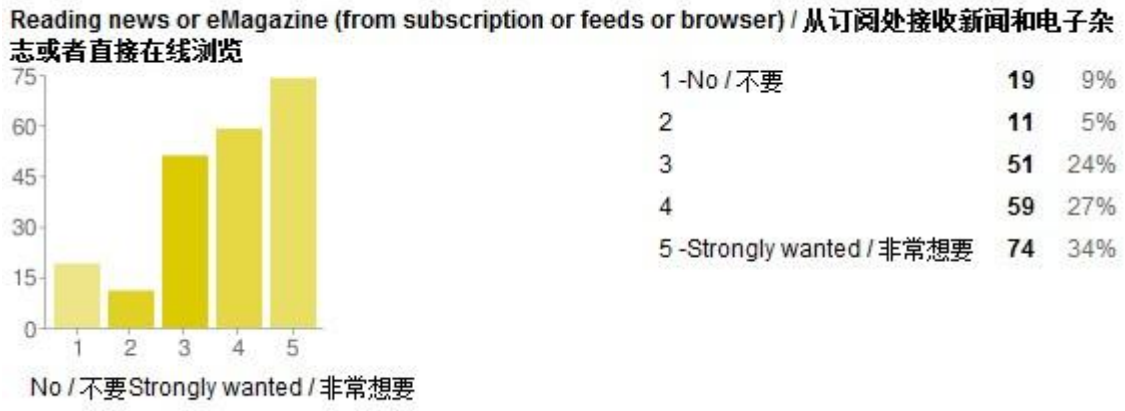

Figure 21: Reading news or e-Magazine

In the question “Watching online video or clip”, 63 (29%) respondents chose “Strongly wanted”, 57 (27%) chose “Likely”, 56 (26%) chose “Not sure”, 22 (10%) chose “No”, 16 (7%) chose “Unlikely”. The result is similar to the previous question, the more powerful hardware in mobile phones, massive data capacity of 3G/4G bandwidth and more digital contents come online, make watching online videos, TV clips, music videos and video blogging easily. The prevalence of video-sharing websites encourages mobile users sharing their videos online. In addition, watching online video on mobile phones is becoming the fashion among young people, and other age group could also find their interests from variety contents. Figure 22 shows the result of watching online video or clip.

1 -No / 不要	22	10%
2	16	7%
3	56	26%
4	57	27%
5 -Strongly wanted / 非常想要	63	29%

Figure 22: Watching online video or clip

In the question “Downloading ringtone, theme, desktop background, screen saver”, 36 (17%) respondents chose “Strongly wanted”, 53 (25%) chose “Likely”, 62 (29%) chose “Not sure”, 33 (15%) chose “No”, 30 (14%) chose “Unlikely”. Downloading ringtone, theme, desktop background and screen saver that were popular several years for mobile phones personalization, have declined due to more sophisticate mobile services coming to mobile phones. The interests of mobile users have moved to mobile contents, which is becoming basic for mobile services and a core business of value-added mobile services. Figure 23 shows the statistics result of downloading personalized mobile contents.

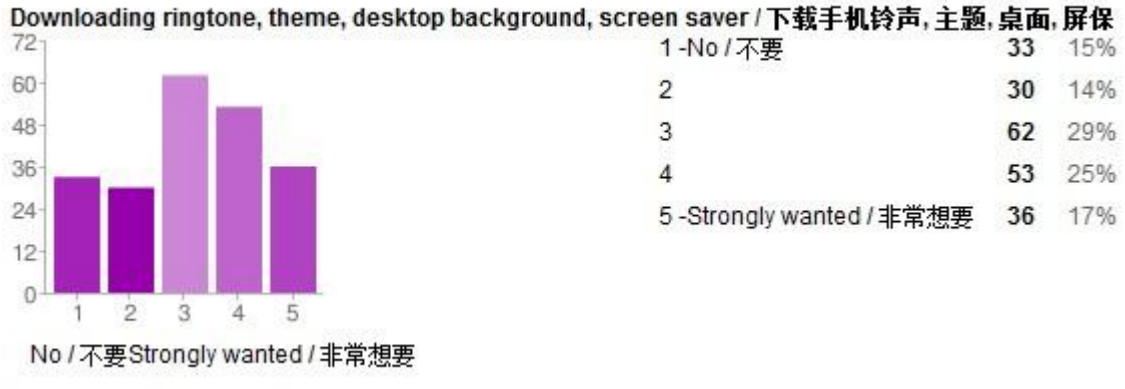

Figure 23: Downloading ringtone, theme, desktop background, screen saver

In the question "Listening to and downloading music", 46 (21%) respondents chose "Strongly wanted", 62 (29%) chose "Likely", 56 (26%) chose "Not sure", 24 (11%) chose "No", and 26 (12%) chose "Unlikely". Figure 24 shows the statistics result of listening to and downloading music.

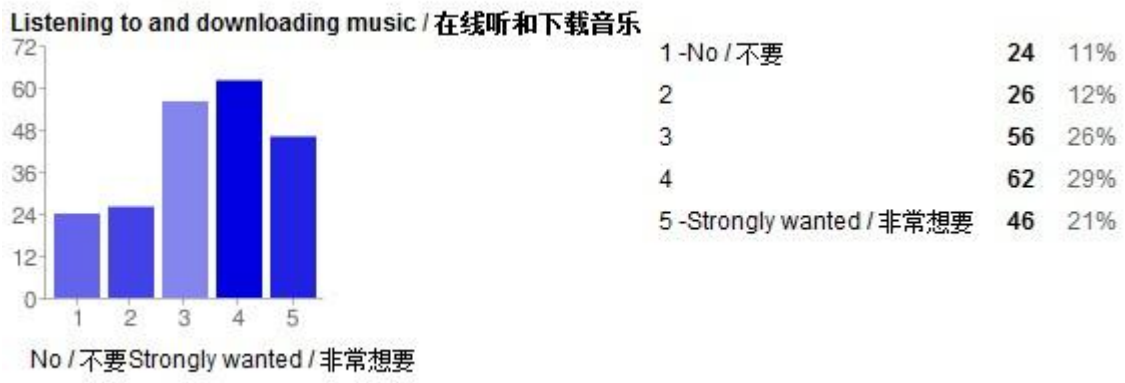

Figure 24: Listening to and downloading music

In the question "Social network services application", 43 (20%) respondents chose "Strongly wanted", 50 (23%) chose "Likely", 68 (32%) chose "Not sure", 37 (17%) chose "No", 16 (7%) chose "Unlikely". Figure 25 shows the statistics result of SNS services.

Figure 25: SNS services application

In the question "Bank services (checking account, bill payment, ordering credit and bank card)", 69 (32%) respondents chose "Strongly wanted", 51 (24%) chose "Likely", 60 (28%) chose "Not sure", 19 (9%) chose "No", 15 (7%) chose "Unlikely". Figure 26 shows the statistics result of bank services.

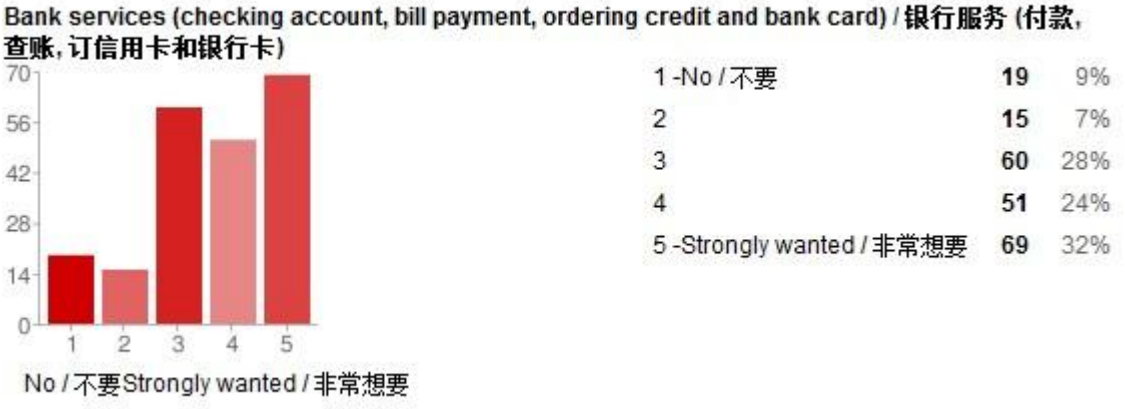

Figure 26: Bank services

In the question "Online shopping, online auction (eBay, Amazon, Taobao)", 41 (19%) respondents chose "Strongly wanted", 38 (18%) chose "Likely", 77 (36%) chose "Not sure", 34 (16%) chose "No", 24 (11%) chose "Unlikely". Figure 27 shows the statistics result of online shopping and online auction.

Figure 27: Online shopping, online auction

In the question "Tickets or seats reservation (restaurant, cinema, pub, theatre, hotel, flight, train, etc.)", 81 (38%) respondents chose "Strongly wanted", 77 (36%) respondents chose "Likely", 35 (16%) chose "Not sure", 14 (7%) chose "No", 7 (3%) chose "Unlikely". Figure 28 shows the statistics result of tickets or seats reservation.

Figure 28: Tickets or seats reservation

In the question "Remote control of office and home appliances (heating system, computer, etc.)", 65 (30%) respondents chose "Strongly wanted", 56 (26%) chose "Likely", 55 (26%) chose "Not sure", 19 (9%) chose "No", 19 (7%) chose "Unlikely". Figure 29 shows the statistics result of remote control of office and home appliances.

Figure 29: Remote control of office and home appliances

In the question “Backup personal data into the safety server (Wireless, Clouds server)”, 55 (26%) respondents chose “Strongly wanted”, 53 (25%) chose “Likely”, 55 (26%) chose “Not sure”, 32 (15%) chose “No”, 19 (9%) chose “Unlikely”. Figure 30 shows the statistics result of backup personal data into the safety server.

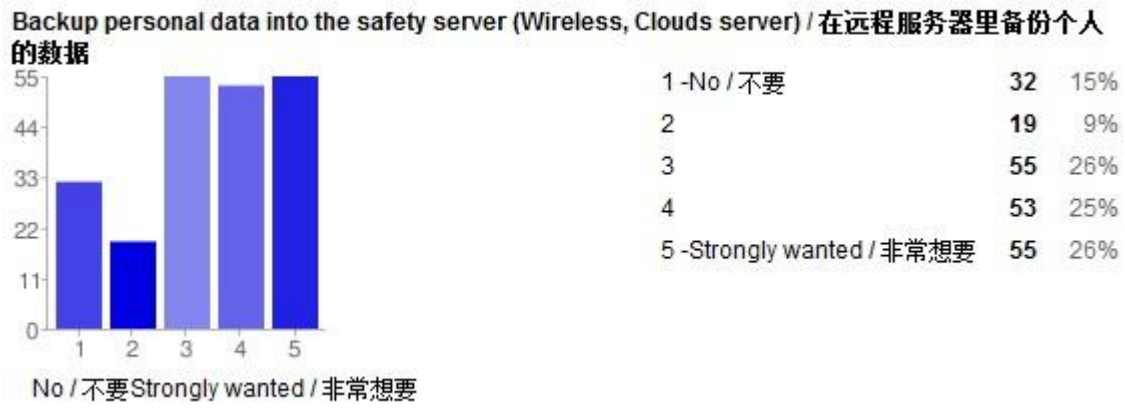

Figure 30: Backup personal data into the safety server

In the question “Download and flash the latest firmware by wireless connection (improve mobile phone performance and stability)”, 62 (29%) respondents chose “Strongly wanted”, 67 (31%) chose “Likely”, 52 (24%) chose “Not sure”, 23 (11%) chose “No”, 10 (5%) chose “Unlikely”. Figure 31 shows the statistics result of download and flash the latest firmware by wireless connection.

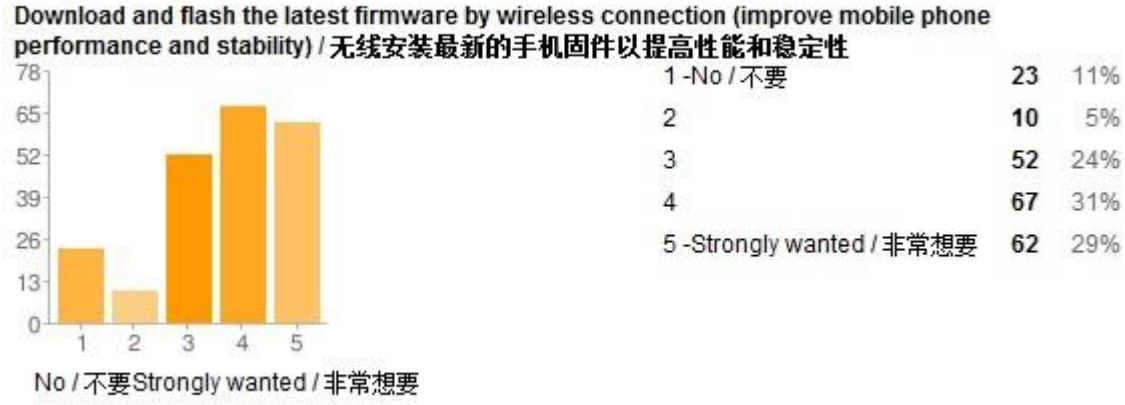

Figure 31: Download and flash the latest firmware by wireless connection

3.4 Summary

After the calculation the mean of statistics for each mobile service question as shown in Table 2, it indicates that the most popular mobile service is “Location, navigation and GPS services” with the average point 4.23 (more than “Likely”). The second most popular mobile service is “Sending and receiving emails” with the average point 4.20 (more than “Likely”), the third is “Tickets or seats reservation” with the average point 3.95 (round to “Likely”), the fourth is “Reading news or e-Magazine” with the average point 3.74 (round to “Likely”), the fifth is “Bank services” with the average point 3.64 (middle of the “Likely” and “Not sure”).

The most unwelcome mobile service is “Mobile advertising in the free application” with average 1.57 (middle of the “No” and “Unlikely”). The second most unpopular mobile service is “Online chatting room” with 2.55 (middle of the “Unlikely” and “Not sure”). The third most unpopular is “Playing online games” with 2.60 (middle of the “Unlikely” and “Not sure”).

In conclusion, the results shows that most of the respondents need a good quality and multifunctional smartphone, which could exchange information, navigate location, and audio-visual entertainment. In contrast, mobile advertising is not welcome, even if it is in a free application. This indicates for the needs of finding a smart way to of selecting the business model and delivery channel.

Mobile services	Mean (1-5)
Mobile instant messenger	3.60748
Mobile advertising in the free application	1.57477
Location, navigation and GPS services	4.22897
Playing online games	2.6028
Online chatting room	2.54673
Electonic payment in shops	3.28505
Stock trading and checking	3.19159
Sending and receiving emails	4.20093
Read news or eMagazine	3.73832
Watching online video or clip	3.57477
Downloading ringtone, themes, etc	3.13551
Listening to and downloading music	3.37383
Social network service application	3.21495
Bank services	3.63551
Online shopping, online auction	3.13084
Tickets or seats reservation	3.95327
Remote control of home appliances	3.6028
Backup personal data into the safety server	3.37383
Flash the latest firmware by wireless	3.63084

Table 2: Mean calculation of mobile services

4. Further analysis of mobile services based on the statistics of the survey

In the last chapter, there are statistics records and analysis that have been carried out for each mobile service question. For the purpose of identifying the respondents' preferences for the questionnaire of mobile services whether they are related with to their gender, age, incomes and expenses, the further calculation and analysis for more specific groups are given in this section.

There are four subsections which are discussed in this chapter:

- Mobile Services vs. Gender
- Mobile Services vs. Age
- Mobile Services vs. Incomes
- Mobile Services vs. Expenses

4.1 Mobile Services vs. Gender

The responses include 138 (64%) male respondents and 77 (36%) female respondents. After the calculation the mean of statistics for each mobile service vs. gender as shown in Table 3, the results indicated that for most of the questions, the male respondents and the female respondents have the same attitude. The largest difference is 0.55 point in the question "Listening to and downloading music". Female respondents are more willing to listening to and downloading music through mobile phone.

The second largest difference is 0.48 point in the question "Downloading ringtone, theme, desktop background, screen saver, etc". Female respondents like to downloading ringtone, theme and background through mobile phone.

The third largest difference is 0.40 point in question “Location, navigation and GPS services”, male respondents have stronger willing to use navigation services. The point of male is 4.37 (More than “Likely”), which is the highest average points in this section. It could be think that due to the male drivers are more than female drivers, then they need the real-time road navigation. The second highest point is 4.28 (round to “Likely”) in the question “Sending and receiving emails”. The third highest point is 3.9 (round to “Likely”) in the question “Tickets or seats reservation”. The lowest point is 1.57 in the question “Mobile advertising in the free application”, it means in the middle of the “No” and “Unlikely”.

The highest points for female is 4.06 (round to “Likely”) in the question “Sending and receiving emails”, the second highest point is 4.05 (round to “Likely”) in the question “Tickets or seats reservation”, the third highest is 3.97 (round to “Likely”) in the question “Location, navigation and GPS services”.

The results that show “Location, navigation and GPS services”, “Sending and receiving emails” and “Tickets or seats reservation” are the most popular mobile services. And also show “Mobile advertising in the free application”, “Online chatting room”, and “Playing online games” are the most unwelcome mobile services.

In conclusion, the survey results show that there is no direct evidence to prove the different viewpoints of male and female respondents. The top three of the most popular mobile services and the bottom three of the most unwelcome mobile services are the same for male and female, they have almost same opinions for each mobile service. Therefore the gender does not affect the attitudes to mobile services.

Mobile services	Mean/Gender	
	Male	Female
Mobile instant messenger	3.64	3.56
Mobile advertising in the free application	1.57	1.58
Location, navigation and GPS services	4.37	3.97
Playing online games	2.49	2.81
Online chatting room	2.6	2.45
Electonic payment in shops	3.26	3.32
Stock trading and checking	3.21	3.16
Sending and receiving emails	4.28	4.06
Read news or eMagazine	3.77	3.68
Watching online video or clip	3.59	3.55
Downloading ringtone, themes, etc.	2.96	3.44
Listening to and downloading music	3.18	3.73
Social network service application	3.23	3.19
Bank services	3.61	3.69
Online sopping, online auction	3.07	3.25
Tickets or seats reservation	3.9	4.05
Remote control of office and home appliances	3.58	3.65
Backup personal data into the safety server	3.4	3.32
Flash the latest firmware by wireless	3.68	3.55

Table 3: Mobile Services vs. Gender

4.2 Mobile Service vs. Age

In age group question, 93 (43%) respondents are between 16 and 27, 90 (42%) respondents are between 28 and 39, 18 (8%) respondents are between 40 and 50, 9 (4%) respondents are great than 50 and 5 respondents (2%) are less than 16.

After the calculation the mean of statistics for each mobile service vs. age groups as shown in Table 4, the results indicated that the different age groups have the very different attitude for each mobile service. In the age group “Less than 16” and age group “Great than 50”, those two groups have different opinions compare with the other age

groups. Indeed, those two groups are not active mobile service users.

In the age group “Less than 16”, the highest point is 3.8 (round to Likely) in the question “Listening to and downloading music”, the second highest point is 3.6 (middle of “Not sure” and “Likely”) in the question “Downloading ringtone, theme, desktop background, screen saver, etc”. The third highest point is 3.4 (middle of “Not sure” and “Likely”) in the question “Location, navigation and GPS services” and “Flash the latest firmware by wireless connections”. The lowest point is 2.2 (round to “Unlikely”) in the question “Mobile instant messenger”, “Online chatting room” and “Remote control office and home appliances”, the second lowest point is 2.6 (middle of “Not sure” and “Unlikely”) in “Electronic payments in shops” and “Read news or e-Magazine”.

In the age group “Great than 50”, the highest point is 3.33 (round to “Not sure”) in the question “Stock trading and checking”, the second highest point is 3.22 (round to “Not sure”) in the question “Remote control office and home appliances”, the third highest point is 3.11 (round to “Not sure”) in the question “Read news or e-Magazine”. The lowest point is 1.56 (middle of “No” and “Unlikely”) in the question “Mobile advertising in the free application”, the second lowest point is 2 (Unlikely) in the question “Playing online games”, the third lowest point is 2.11 (round to “Unlikely”) in the question “Online chatting room”, “Social network service application” and “Online shopping and online auction”. The average point is around 2 (Unlikely) between 3.33 and 1.56, which indicates the respondents in the age group “Great than 50” are not active mobile services users, they have little interest in mobile services. Their interests are in stocki trading, remote control of office and home appliances and reading news or e-Magazines.

In the age group “16 - 27” and “28 - 39”, the respondents show that they have interests in “Location, navigation and GPS services”, “Sending and receiving emails”, “Tickets or seats reservation”, “Read news and e-Magazine”, “Mobile instant messenger”, “Bank services”, “Watching online video or clip”, “Listening to and download music”, “Remote control of office and home appliances” and “Flash the latest firmware by wireless connections”. The average points on those questions are round to 4 (Likely). The lowest points are in the question “Mobile advertising in the free applications”, “Online chatting room” and “Playing online games”. The opinions are between “Not sure” and “No”. The results indicated the respondents in the age group “16 - 27” and “28 - 39” are the most active groups, they prefer to have many mobile services in their mobile phones.

In the age group “40 - 50”, the highest points are “Location, navigation and GPS services”, “Sending and receiving emails”, “Tickets or seats reservation”, “Read news and e-Magazine”, “Bank services”, and “Flash the latest firmware by wireless connections”. The interesting finding is the lowest points is 1.44 (middle of “No” and “Unlikely”) in the question “Mobile advertising in the free application”, which is the lowest point in this section.

In conclusion, the results indicated that the different age group have the different attitudes to mobile services. In the age group “Less than 16” and “Great than 50”, those two groups are inactive users of mobile services. They have interests in mobile services only related with their life sides. In the age group “40 - 50”, the respondents rated the services mostly round to 3 (Not sure), they have the least patient on mobile services in all the age groups. In the age group “16 - 39”, without a doubt, the respondents are the most active users of mobile services, they have many interests in different mobile services, but the mobile advertising is still unwelcome.

Mobile services	Mean/Age group				
	<16	16-27	28-39	40-50	>50
Mobile instant messenger	2,2	3,99	3,59	2,83	2,22
Mobile ads in the free application	2,8	1,66	1,46	1,44	1,56
Location, navigation, GPS services	3,4	4,38	4,36	3,72	2,89
Playing online games	3	2,8	2,53	2,11	2
Online chatting room	2,2	2,61	2,6	2,28	2,11
Electonic payment in shops	2,6	3,47	3,24	3,11	2,67
Stock trading and checking	2,8	3,29	3,27	2,33	3,33
Sending and receiving emails	3	4,47	4,22	3,72	2,89
Read news or eMagazine	2,6	3,9	3,81	3,17	3,11
Watching online video or clip	3,2	3,78	3,6	2,89	2,78
Downloading ringtone, themes, etc	3,6	3,33	3,08	2,5	2,78
Listening to and downloading music	3,8	3,5	3,42	2,78	2,56
Social network service application	2,8	3,41	3,28	2,56	2,11
Bank services	2,8	3,75	3,76	3,17	2,67
Online shopping, online auction	3,2	3,29	3,17	2,61	2,11
Tickets or seats reservation	2,8	4,05	4,11	3,44	3
Remote control of home appliances	2,2	3,8	3,63	3	3,22
Backup personal data into the server	3	3,59	3,31	2,94	2,89
Flash the latest firmware by wireless	3,4	3,85	3,53	3,39	3

Table 4: Mobile services vs. age groups

4.3 Mobile Services vs. Incomes

In question “Your income per month”, 52 (24%) respondents are less than 200 Euros at the first place, 43 (20%) respondents are between 200 - 400 Euros, 35 (16%) respondents are between 401 - 800 Euros, 22 (10%) are between 801 - 1300 Euros, 19 (9%) are between 1301 - 2000 Euros, 20 (9%) are between 2001 - 3000 Euros, 24 (11%) are great than 3000 Euros.

After the calculation the mean of statistics for each mobile service vs. income groups as shown in Table 5, the results indicated that the different income groups have a little different attitude for each mobile service. The largest difference is 1.15 point in the

question “Mobile instant messenger”, the incomes group “800 - 1300 Euros” rated 4.18 (Likely), the incomes group “Great than 3000 Euros” rated 3.04 (Not sure). The second largest different point is 1.10 point in the question “Playing online games”, the incomes group “800 - 1300 Euros” rated 3.05 (Not sure), the incomes group “1300 - 2000 Euros” rated 1.95 (Unlikely).

The highest point is 4.7 (round to “Strongly wanted”) in “Sending and receiving emails” and the second highest point 4.64 (round to “Strongly wanted”) in “Location, navigation and GPS services” that come from the incomes group “2000 – 3000 Euros”, the lowest point is 1.3 (round to “No”) in the question “Mobile advertising in the free application”, the second lowest point is 2.1 (round to “Unlikely”) in the question “Playing online games”, the third lowest point is 2.2 (round to “Unlikely”) in the question “Online chatting room”.

In conclusion, the survey results show that there is no direct evidence to prove there are different viewpoints for the different incomes groups. There are some mobile services are popular for all incomes groups, e.g. “Location, navigation and GPS services”, “Sending and receiving emails”, “Tickets or seats reservation”, “Read news and e-Magazine”, “Mobile instant messenger”, “Bank services”, “Watching online video or clip”, “Listening to and download music”, “Remote control of office and home appliances”, “Backup personal data into the safety server” and “Flash the latest firmware by wireless connections”. Again, “Mobile advertising in the free application” is the most unwelcome in mobile services. “Online chatting room” and “Playing online games” are also not popular for all incomes groups.

Mobile services	Mean/Incomes group (Euro/Month, k=1000)						
	<0.2k	0.2-0.4	0.4-0.8	0.8-1.3	1.3-2.0	2.0-3.0	>3.0k
Mobile instant messenger	3.63	3.58	3.79	4.18	3.79	3.15	3.04
Mobile ads in the free application	1.65	1.44	1.79	1.59	1.21	1.3	1.83
Location, navigation, GPS services	4.38	4	4.06	4.41	4.37	4.65	3.92
Playing online games	2.63	2.72	2.85	3.05	1.95	2.1	2.5
Online chatting room	2.48	2.42	2.94	2.91	2.32	2.2	2.5
Electonic payment in shops	3.1	3.6	3.24	3.77	3.37	2.95	2.96
Stock trading and checking	2.98	3.49	3.65	3.41	2.84	2.8	2.88
Sending and receiving emails	4.25	3.84	4.12	4.27	4.53	4.7	4.13
Read news or eMagazine	3.71	3.77	3.65	4.18	3.58	4.05	3.33
Watching online video or clip	3.57	3.72	3.62	3.91	3.37	3.5	3.17
Downloading ringtone, themes, etc	3.17	3.51	3.26	3.09	2.74	2.85	2.79
Listening to and downloading music	3.52	3.49	3.44	3.55	3	3	3.21
Social network service application	3.37	2.72	3.71	3.45	2.63	3.2	3.33
Bank services	3.38	3.63	3.65	4.18	3.95	3.6	3.46
Online shopping, online auction	3.08	3.37	3	3.27	3.42	2.55	3.13
Tickets or seats reservation	3.71	4.14	4	4.41	4.16	3.9	3.54
Remote control of home appliances	3.5	3.74	3.53	3.55	3.63	4.2	3.21
Backup personal data into server	3.54	3.33	3.44	3.14	3.21	3.8	3
Flash the latest firmware by wireless	3.83	3.74	3.56	3.59	3.53	3.65	3.21

Table 5: Mobile services vs. income groups

4.4 Mobile Services vs. Expenses

In question “How much you pay mobile phone bill per month”, 100 (47%) respondents are less than 20 Euros at the first place, 65 (30%) respondents are between 20 - 40 Euros, 32 (15%) respondents are between 41 - 60 Euros, 5 (2%) are between 61 - 80 Euros, 6 (3%) are between 81 - 100 Euros, 7 (3%) are Great than 100 Euros.

Because in the question of respondents mobile expenses, 5 (2%) are between 61 - 80 Euros, 6 (3%) are between 81 - 100 Euros, 7 (3%) are Great than 100 Euros. The number is too less from expenses group “great than 60 Euros”. Then, the different compare method is not suit for the analysis of this section. The highest and lowest points would be better solution of analysis.

After the calculation the mean of statistics for each mobile service vs. expense groups as shown in Table 6, the survey results show that there is no directly evidence to prove there are different viewpoints from the different expenses groups. “Location, navigation and GPS services”, “Sending and receiving emails”, “Tickets or seats reservation”, “Read news and e-Magazine”, “Mobile instant messenger”, “Bank services”, “Watching online video or clip”, “Listening to and download music”, “Remote control of office and home appliances”, “Backup personal data into the safety server” and “Flash the latest firmware by wireless connections” are the popular mobile services. Again, “Mobile advertising in the free application” is the most unwelcome in mobile services. “Online chatting room” and “Playing online games” are also not popular for all expenses groups.

Mobile services	Mean/Expenses group (Euro/month)					
	<20	20-40	40-60	60-80	80-100	>100
Mobile instant messenger	3.52	3.86	3.34	3.2	3.67	3.71
Mobile ads in the free application	1.67	1.54	1.38	1	1	2.29
Location, navigation, GPS services	4.1	4.51	4.22	3.6	4.67	3.71
Playing online games	2.34	2.98	2.63	2	2.5	3.29
Online chatting room	2.35	2.86	2.44	2	2.67	3.29
Electonic payment in shops	3.15	3.52	3.19	3	3.33	3.71
Stock trading and checking	2.97	3.49	2.91	4.2	3	4.14
Sending and receiving emails	4	4.37	4.38	4.6	4.83	4
Read news or eMagazine	3.57	4.02	3.72	3.6	3.33	4.14
Watching online video or clip	3.43	3.92	3.41	3.2	3	4
Downloading ringtone, themes, etc	3.07	3.46	2.75	3	2.17	3.86
Listening to and downloading music	3.45	3.52	3	2.6	2.67	3.86
Social network service application	3.11	3.58	2.88	2.8	2.67	3.57
Bank services	3.52	3.78	3.69	3.2	3.83	3.57
Online shopping, online auction	3.14	3.19	3.06	3	2.5	3.71
Tickets or seats reservation	3.84	4.08	4.16	4	3.67	3.71
Remote control of home appliances	3.46	3.77	3.72	3.6	3.67	3.57
Backup personal data into the server	3.23	3.57	3.38	3	3.5	3.71
Flash the latest firmware by wireless	3.67	3.65	3.53	3.6	3.33	3.71

Table 6: Mobile services vs. expense groups

5. Conclusion

This thesis is a study of mobile services based on consumer's evaluation, which includes background information and survey analysis from the statistics of a mobile services' survey. To develop successful mobile services, the most important thing that is to understand customer requirements and to design the mobile services to meet their expectations. With the objective of indicating the acceptance of mobile phone users for different mobile services, a mobile services online survey had been distributed to several oversea Chinese email lists and websites on April 26, 2010. There were totally 26 questions that included 4 demographic questions, 3 mobile phone brand related questions and 19 mobile services questions which asked acceptance of different mobile services by the Likert Scale form. The online survey was made by Google Docs form. The results of responses show that 215 responses had been received until May 31, 2010.

From the results obtained by the analysis of survey results, there are abundant mobile services in mobile phones to meet different motivations of mobile phone users. These motivations can be mainly divided into four categories, which are online information search, multifunctional tools, real-time communication and entertainment.

The motivation of online information search (IS) is that searching for unfamiliar subjects and unknown by mobile phones through an application or a web browser. From the results of survey, "Location, navigation and GPS services" is the one of the most popular mobile services.

The need for multifunction has brought differently featured mobile phones, which are music phone, camera phone, GPS phone, Qwerty keyboard phone and touch screen phone. As a matter of fact, the smartphone has integrated almost all of those functions inside of the thin body. Nokia N97 and Apple iPhone are representational products of the smartphone market. The results of the survey analysis show that the respondents need a multifunctional mobile phone with the navigation, Qwerty keyboard, touch screen, and remote module.

The motivation of communication is not only the call telephony but also indirect communication. For example receiving and sending emails, online chatting, reading news and blogs are indirect communication. The results of the survey analysis show that the respondents have a little interests in online chatting, the indirect communication are more popular. "Sending and receiving emails" and "reading news and e-Magazine" are the welcome mobile services, the respondents preferred individual communication and less online communication.

The motivation of entertainment has increased fast with mobile media exploitation and massive digital contents from internet. Because mobile phone users take their mobile phones all the time, if their mobile phones are the multimedia entertainment device which could spend in the idle time and be separated themselves from others.

The survey's results indicated that the location, navigation and GPS services are the most popular mobile service, the second most popular mobile service is sending and receiving emails, the third is tickets and seats reservation. The lowest mobile service is advertising in the free application.

After Apple launched iPhone in 2007, the global mobile phone competence has moved from hardware R&D to mobile phone software platform, which makes the mobile software and mobile services platform crucial, which meant not only the OS, but also need the open software R&D platform and the services platform. Microsoft, Apple and Google, even RIM, those IT companies know how to explore the new software service platform, how to build a set of OS, and how to help and support independent software vendor. This is the disadvantage of Nokia, which is good at hardware manufacture but there is big gap to change the core of the company to be a mobile internet company.

The mobile phone users want to change their role from passive to active, so they could decide what kind of mobile services they need or not. Indeed, they want to use the mobile phone as the same experience as use computer. Mobile vendors need to open their development platform and encourage variety of contents providers to keep developing advanced mobile services.

With these wireless technologies, mobile users can acquire mobile services while on the move, which gives mobile users great flexibility and convenience. It is obvious that the mobile services will continue to evolve and become more and more central to everyday lives of consumers. Based on the study in this thesis, location-based services and applications will bloom in the future. Mobile advertising should find more smart delivery channels to gain popularity; otherwise it will never become fully accepted by consumers.

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APPENDIX

Below is the survey used to gather the results of mobile services.

The survey was implemented using Google Docs Form –online service.

To find out the preferences and motivations of mobile users, I selected 19 of the most frequently mentioned mobile services and used the analytical framework to evaluate them in this section.

The evaluation of each question by using a Likert scale, which was listed as a 5 points scale:

"1 = No / Strongly disagree"
"2 = Unlikely / Disagree"
"3 = Not sure / Neither agree or disagree"
"4 = Likely / Agree"
"5 = Strongly wanted / Strongly agree".

The results of responses show that 215 responses had been received until May 31, 2010. There was one respondent left a total blank in this section, maybe it was caused by server error of Google Docs.

Mobile services survey / 手机服务调查

The survey responses will only be used for my personal master thesis.There is no commercial intent involved. Thank you for your time and feedback.

这个调研只是用作个人硕士论文研究， 没有任何商业行为。 非常感谢您的参与和反馈。

* Required

What is your gender? / 您的性别？ *

Male/ 男

What is your age? / 您的年龄？ *

less than 16 / 小于16

Your income per month / 您的月收入 *

EURO / 人民币 RMB

less than 200 euro / 小于 2000 rmb

How much you pay mobile phone bill per month? / 您一个月手机话费是多少？ *

EURO / 人民币 RMB

less than 20 euro / 小于200 mb

Which brand of mobile phone are you using? / 您正在使用哪种手机？ *

- [ ] Apple Iphone / 苹果
- [ ] HTC (Google Android)
- [ ] LG
- [ ] Motorola / 摩托罗拉
- [ ] Nokia / 诺基亚
- [ ] Palm
- [ ] RIM (Blackberry) / 黑莓
- [ ] Samsung / 三星
- [ ] Sony Ericsson / 索爱
- [ ] Other:

Which brand of mobile phone is your favorite? / 以下您最喜欢哪种手机品牌？ *

- [ ] Apple Iphone / 苹果
- [ ] HTC (Google Android)
- [ ] LG
- [ ] Motorola / 摩托罗拉
- [ ] Nokia / 诺基亚
- [ ] Palm
- [ ] RIM (Blackberry) / 黑莓
- [ ] Samsung / 三星
- [ ] Sony Ericsson / 索爱
- [ ] Other:

Which mobile phone OS do you think is better than others? / 您认为以下哪种手机系统更好？ *

- [ ] Apple Iphone OS / 苹果 IPHONE OS
- [ ] Google Android
- [ ] RIM Blackberry / 黑莓
- [ ] Symbian / 塞班
- [ ] Windows Mobile / 微软
- [ ] Linux / Palm / Nokia Maemo
- [ ] No idea / 不清楚 不了解
- [ ] Other:

Mobile services survey / 手机服务调查

* Required

Which mobile services and value added services would you accept / 您可能会接受的手机服务及增值服务

Mobile instant messenger (MSN messenger, skype, yahoo messenger, QQ, etc.) / 移动即时通讯软件 (QQ, MSN messenger, skype, yahoo messenger, 或其他) *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Mobile advertising in the free application / 免费软件内置的广告 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Location navigation, GPS service / 定位导航服务, 全球定位系统 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Playing online games / 在线联网游戏 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Online chatting room / 在线聊天室 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Electronic payment in shops / 商店购物电子付款 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Stock trading and checking / 股票交易和查询 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly Wanted / 非常想要

Sending and receiving emails / 发送接收邮件 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Reading news or eMagazine (from subscription or feeds or browser) / 从订阅处接收新闻和电子杂志或者直接在线浏览 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Watching online video or clip / 观看在线视频短片 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Downloading ringtone, theme, desktop background, screen saver / 下载手机铃声, 主题, 桌面, 屏保 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Listening to and downloading music / 在线听和下载音乐 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Social network services application (Facebook, MySpace, Twitter, Google Buzz, Kaixin, Renren, etc.) / 社交网站手机版 (Kaixin, Renren, Facebook, MySpace, Twitter, 或其他) *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Bank services (checking account, bill payment, ordering credit and bank card) / 银行服务 (付款, 查账, 订信用卡和银行卡) *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Online shopping, online auction (Ebay, Amazon, Taobao, etc.) / 在线拍卖购物 (淘宝, 易趣等) *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Tickets or seats reservation (restaurant, cinema, pub, theater, hotel, flight, train, etc.) / 预订服务 (餐馆, 酒吧, 电影院, 戏院, 旅馆, 飞机, 火车等) *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Remote control of office and home appliances (heating system, computer, etc.) / 远程控制, 开关办公室和家里的暖气, 电器等 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Backup personal data into the safety server (Wireless, Clouds server) / 在远程服务器里备份个人的数据 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要

Download and flash the latest firmware by wireless connection (improve mobile phone performance and stability) / 无线安装最新的手机固件以提高性能和稳定性 *

	1	2	3	4	5	
No / 不要	◯	◯	◯	◯	◯	Strongly wanted / 非常想要